STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY AND CATALOGING OF SPORT FISH AND SPORT FISH WATERS OF THE COPPER RIVER, PRINCE WILLIAM SOUND, AND UPPER SUSITNA RIVER DRAINAGES

by

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Volume 22 Study No. G-I

RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations of Alaska

Project No.: F-9-13

Study No.: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-F Job Title: Inventory and Cataloging of Sport Fish and Sport Fish Waters of the Copper River, Prince William Sound, and the Upper Susitna River Drainages.

Cooperators: Fred T. Williams and Wilson D. Potterville

Period Covered: July 1, 1980 to June 30, 1981.

ABSTRACT

Test netting in nine managed lakes was conducted. The results from Tolsona Lake showed a serious decline in the grayling population. The net frequency of 0.52 Arctic grayling, Thymallus arcticus (Pallas) was the second lowest since test netting was begun in 1963.

Population estimates were made on Swanson River rainbow trout, Salmo gairdneri Richardson, which were stocked in Tex Smith and Crater Lakes in 1979. The survival was determined to be 40 percent (N = 1,881) and 41 percent (N = 1,651), respectively.

A creel census on the Gulkana River was conducted for the sixth consecutive year. In 1980 a total of 7,797 anglers caught 1,320 chinook salmon, Onocorhynchus tshawytscha (Walbaum), 676 sockeye salmon, Oncorhynchus nerka (Walbaum), 753 rainbow trout and 5,719 grayling. Angler participation was almost exactly the same as in 1979, while the catch of chinook salmon dropped 33 percent. The reduced catch was due to poor fishing conditions in the middle and lower river sections.

Measurements from 137 sport-caught grayling from the Gulkana River compared favorably with data collected in 1968, 1978 and 1979. The average length of grayling measured in 1980 was only 5 millimeters less than those measured in 1979 and 22 millimeters less than those measured in 1968.

Stream surveys in the Valdez area revealed a better than average escapement for an even year, which are historically lower than odd years. Totals of 1,668 pink salmon, Oncorhynchus gorbuscha (Walbaum), 2,521 chum salmon, Oncorhynchus keta (Walbaum), 6,801 coho salmon, Oncorhynchus kisutch (Walbaum), and 1,000 sockeye salmon were counted.

Length data from sport-caught round whitefish, Prosopium cylindraceum (Pallas) and broad whitefish, Coregonus nasus (Pallas), from the Slana River showed insignificant change when compared to data collected during 9 previous years.

Thirty-six hundred Age 0+ coho salmon trapped in Corbin Creek (tributary to Robe Lake) in May and July were fin-clipped. Later trapping in Robe Lake and Robe River took none of these marked fish until December which indicates the young coho spent considerable rearing time in the parent stream rather than in the lake.

BACKGROUD

The Copper River Basin, Upper Susitna River drainage and northeast Prince William Sound areas are typical of many within the state, in that recreational angling opportunity is provided by a number of anadromous species and also by both indigenous and stocked lake and stream dwelling fishes.

The stream dwelling species most often taken by sport anglers are Arctic grayling, Dolly Varden, chinook and sockeye salmon.

The majority of angling pressure is on waters adjacent to the highway system. This area, including the Copper Basin, Cordova and Valdez, has over 650 miles of the Alaska Highway System. A map of the study area is presented in Figure 1.

The principal lake dwelling species caught by recreational anglers in the Glennallen area are the indigenous species, burbot, lake trout and Arctic grayling; and the introduced species, coho salmon and rainbow trout.

The Cordova (Prince William Sound) area is primarily commerical fishing oriented. Access to this area is only by boat or aircraft. Sport fishing effort in salt water is light and primarily for coho salmon, chinook salmon and halibut. Fresh water angling is directed toward coho salmon, cutthroat trout, sockeye salmon, Dolly Varden and stocked grayling. A significant increase in sport fishing effort is not anticipated until access to and within the area improves.

The limited Cordova area road system (approximately 60 miles) affords access to several lakes and streams with Arctic grayling, cutthroat trout and coho salmon populations.

Most of the recreational angling opportunities in the Valdez area are provided by saltwater fisheries directed toward anadromous species, including pink salmon, chum salmon, coho salmon, and bottom fish. All

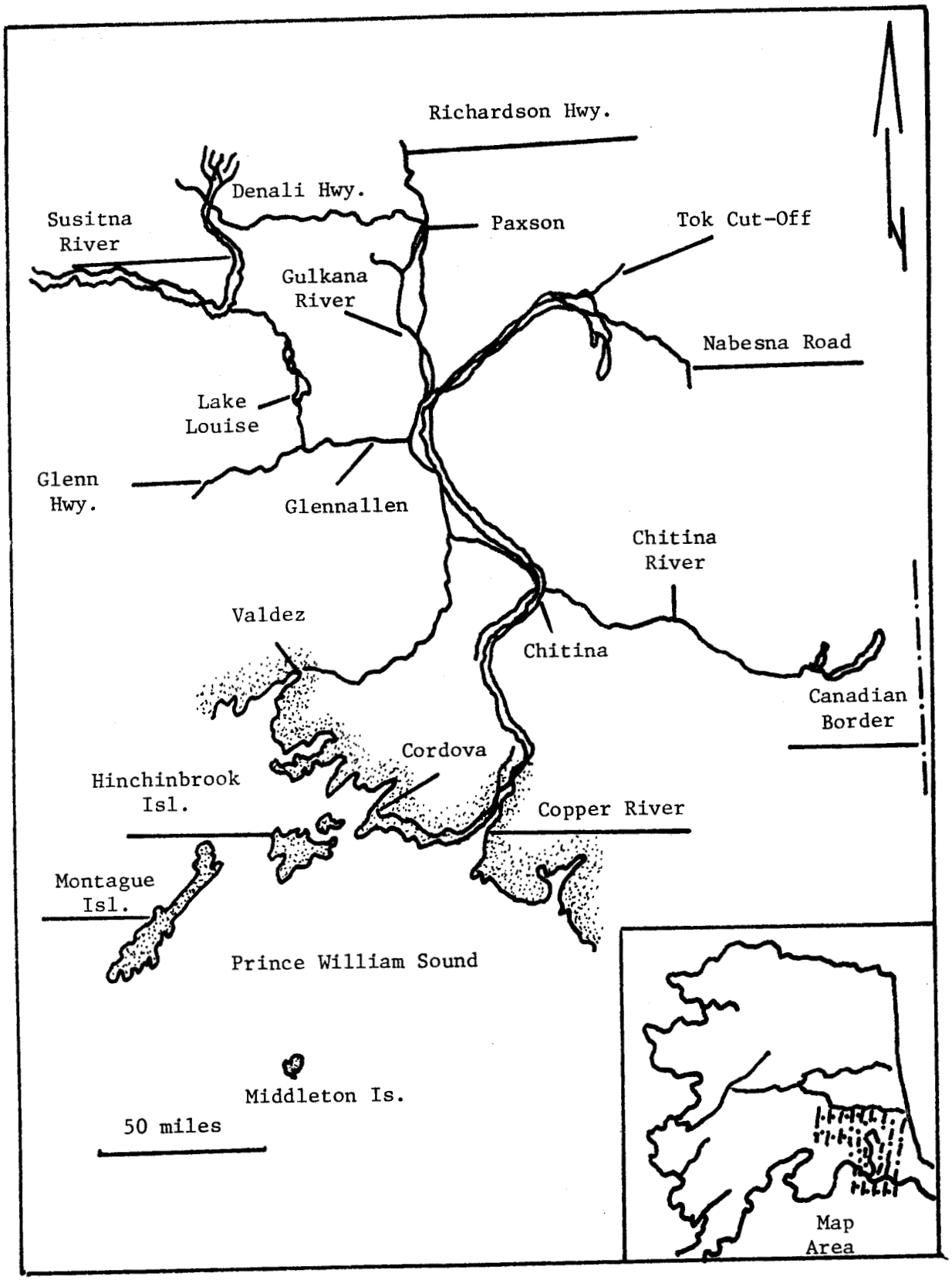

Figure 1. Map of the Study Area.

freshwater drainages into Valdez Arm are closed to salmon fishing, but Dolly Varden are taken in fair numbers.

The present population of Valdez is estimated to be 4,500. If construction of the Alpetco plant at Valdez begins in 1981, there will be an estimated 2,800 people employed. This large work force, plus their dependents, will be reflected in an increase in fishing effort.

It is expected that Valdez will continue to grow and become more industrialized in the future. This trend in growth may have a detrimental effect on the fisheries. Suitable land for homes and businesses is limited in the Valdez area and already there are trailer courts and housing projects adjacent to or bisected by salmon spawning streams. Spawning and rearing areas for fish may be reduced, polluted and, possibly, ground water supplies will be affected. Presently the fish stocks are generally in good condition, and there appears to be no need for more restrictive angling regulations at this time. However, with an increase in the human population, increased harassment of spawning salmon can be expected, and increased monitoring of the fisheries and the environment will be necessary to protect the resource.

Activities reported in the following text are directed toward the research and subsequent management needs of these species and toward the attainment of desirable levels of angler utilization. The species of fish discussed in this report are listed in Table 1.

RECOMMENDATIONS

1. The study of anadromous fish stocks in the Upper Copper River drainage and Prince William Sound should be continued to determine timing and magnitude of runs.

2. Monitoring of seismic activities, road and bridge construction, pipeline maintenance, and other land uses should be continued to afford maximum protection to the fishery resource and habitat.

3. Continued evaluation should be made of experimental fish stocking to determine the species and strains of fish best suited for individual lakes. This can be done by comparing the survival and growth of various strains of rainbow trout and coho salmon.

4. Cataloging and inventory surveys should be continued on a limited basis as required to increase our knowledge of the fisheries resources in the area and provide more fishing opportunities for the angler.

5. Investigations of grayling in the Gulkana River should be continued to determine age-length composition of sport-caught fish and any deterioration of the fishery.

Table 1. List of Common Names, Scientific Names and Abbreviations.

Common Name	Scientific Name and Author	Abreviation
Pink salmon	Onchorhynchus gorbuscha (Walbaum)	PS
Chinook salmon	Oncorhynchus tshawytscha (Walbaum)	KS
Chum salmon	Oncorhynchus keta (Walbaum)	CS
Coho salmon	Oncorhynchus kisutch (Walbaum)	SS
Sockeye salmon	Oncorhynchus nerka (Walbaum)	RS
Dolly Varden	Salvelinus malma (Walbaum)	DV
Lake trout	Salvelinus namaycush (Walbaum)	LT
Rainbow trout	Salmo gairdneri Richardson	RT
Threespine stickleback	Gasterosteus aculeatus Linnaeus	TST
Burbot	Lota lota (Linnaeus)	BB
Sucker	Catostomus catostomus (Forster)	S
Arctic grayling	Thymallus arcticus (Pallas)	GR
Round whitefish	Prosopium cylindraceum (Pallas)	WF
Broad whitefish	Coregonus nasus (Pallas)	WF

6. Investigations of waters in the Valdez area should continue as required to determine the feasibility of proposed rehabilitation and/or enhancement programs of salmon stocks. Cooperative work with the Valdez Fisheries Development Association should be continued.

7. The creel census program on the Gulkana River should be discontinued at this time. This creel census has been conducted annually since 1975 and the effort and harvest is very close to the data received from the Statewide Harvest Surveys.

8. A creel census program should be initiated for the Valdez area when funds are available. Preferably the census should be conducted during an odd year since the pink and chum runs are much higher in those years. The last two creel census programs were conducted during even (low run) years.

9. The degree of monitoring of the whitefish fishery in the Slana River should be increased. Private landowners who control access to the fishery have expressed concern about over-exploitation of the resources.

OBJECTIVES

1. To determine the magnitude of various fish stocks and develop plans for their enhancement.

2. To determine stocking measures, formulate recommendations for the management of area waters and direct the course of future studies.

3. To determine the environmental characteristics of the existing and potential recreational fishing waters of the job area and, where practical, obtain estimates of the sport fish harvest and angler participation rates.

4. To determine the effects of proposed construction programs on fisheries and fisheries environment, and assist in determining the current status of public access and access needs to the recreational fishing waters.

TECHNIQUES USED

Standard techniques described by Williams (1971) were used in lake and stream surveys and for collection of fish samples. Each test netting was conducted for a minimum of 16 hours, including an overnight period. Salmon enumerations were made from aircraft and on foot. All measurements of fish length were from snout to fork of tail. Fyke nets were also used for fish collection.

The Gulkana River was divided into three sections for purposes of creel census, based on accessibility. These sections were (1) lower, from the mouth upstream for a distance of 2 miles; (2) middle, in the vicinity of Richardson Highway bridge; and (3) upper, from the mouth of Sourdough Creek upstream to the West Fork of the Gulkana River. The middle section was subdivided into the Bridge and Glenn Rich Pit Sections.

During the creel census on the Gulkana River, the fishing day was determined to be between the hours of 8:00 a.m. and midnight, and was further divided into four separate 4-hour periods. Weekends and holidays were each censused during two randomly chosen 4-hour periods. Two randomly chosen weekdays per week were each censused during one randomly selected 4-hour period. This creel census schedule was applied to all three sections.

During Robe Lake investigations, minnow traps were used to collect juvenile salmon. Dissolved oxygen concentrations were determined using a Hach Kit with powder pillows.

Baited minnow traps were used to capture juvenile rainbow trout from Tex Smith and Crater Lakes. The Schnabel method was used for population estimates.

FINDINGS

Population Sampling, Managed Lakes

Hunter Lake, near Mile 122, Glenn Highway, and Jack Lake, Mile 28 Nabesna, were test netted in 1980 to determine their potential as egg take sites (Table 2). In Hunter Lake test nets were fished a total of 169 net hours and only 76 grayling were captured for a net frequency of 0.45 fish per hour. The test netting was done once in July and twice during August. It appears the grayling population may be no better than in Tolsona Lake and the potential as an egg take site is poor. In addition, access would be by ATV equipment, which always presents potential problems.

Eighty-eight test hours on Jack Lake captured 40 grayling for a net frequency of 0.45 fish per hour. Sampling at Jack Lake was not as complete as desired, so it will be checked again in the spring of 1981.

Tolsona Lake Grayling

Tolsona Lake has a surface area of 320 acres and a maximum depth of 13 feet. This eutrophic lake is fed by three small streams. Two of the inlets are intermittent and the major one, Bessie Creek, generally runs all summer. This stream freezes solid in late winter.

Bessie Creek, tributary to Tolsona Lake, has been used as a source of grayling eggs since 1965. Until 1979 the average take of eggs has been 1,000,000, which satisfied the hatchery requirements. This required stripping approximately 200-250 females depending on size and fecundity.

Table 2. Gill Net Summary, Previously Surveyed Lakes, 1980.

Name	Location	Number of fish	Species	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Arizona	T8N R7W S11	25	GR	114-356	284	1.04	100
Bell	T8N R7W S22	23	LT	425-645	538	.48	21
		4	GR	190-195	193	.08	4
		60	WF	180-470	234	1.25	56
		20	SK	100-465	372	.42	19
Caribou	T5N R7W S16	34	GR	216-324	259	.71	100
Elbow	T5N R7W S22	80	GR	102-343	181	1.67	100
Hunter	T20N R12E S1	76	GR	130-410	282	.45	100
Jack	T9N R11E S36	40	GR	180-390	235	.45	49.5
		36	WF	240-470	392	.41	44.5
		3	LT	455-615	557	.03	4
		2	BB	370-545	458	.02	2
Snowshoe	T3N R8W S16	20	GR	145-325	260	.26	18
		74	WF	205-380	263	.95	65
		1	BB	300	300	.01	1
		18	SK	125-460	339	.23	16
Tolsona	T8N R7W S11	23	GR	170-380	242	.52	31
		51	SK	160-410	266	1.16	68
		1	BB	130	130	.02	1

Table 2. (Cont.) Gill Net Summary, Previously Surveyed Lakes, 1980.

Name	Location	Number of Fish	Species	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Tom's	T6N R6W S17	2	BB	210-430	320	.04	03
		13	GR	115-215	151	.29	16
		28	WF	150-405	310	.62	35
		36	SK	95-535	3.4	.80	46

* Species

GR - Grayling
WF - Whitefish
LT - Lake trout
BB - Burbot
SK - Sucker

** Frequency is number of fish per net hour.

In the past it has been necessary to trap and retain only a portion of the spawning run to satisfy egg requirements (Table 3). In 1979 the entire run was trapped and only 220 fish were captured. In 1980 the entire run was also trapped and only 26 grayling were taken.

Test netting has been conducted at Tolsona Lake since 1963 (Table 3). The net frequencies are shown in Table 3 and show considerable variation from year to year; however, during the years 1970 through 1978 the catch rate was considered acceptable. In 1979 and 1980 trapping and test netting showed a definite decline in grayling numbers.

In 1979, 206 adult grayling trapped at Bessie Creek were marked by removal of the adipose fin. Approximately two months later the lake was test netted. Seventeen of the 40 grayling taken were marked fish (42%). During trapping operations in Bessie Creek in 1980, 17 of the 26 adults were marked fish. In 1980 the lake was again test netted and four of the 23 grayling captured were marked fish (17%). Based on the recovery of marked fish and the number of fish trapped, it is apparent that the grayling population is very low.

Dissolved oxygen determinations (D.O.) have been conducted at Tolsona since 1963 (Table 3). Historically Tolsona Lake has been noted for low winter D.O.'s. These values show considerable variance from year to year. In 1971, dissolved oxygen determinations taken in March showed a low of 0.5 ppm at a depth of 5 feet. That winter there was a partial winter kill on grayling, suckers and burbot. No egg take was made that spring. Since 1971 winter dissolved oxygen has been within the survival limit for grayling and no other winter kills have been noted.

From 1968 to 1978 at least 75,000 grayling have been stocked annually in Tolsona Lake. The last time it was stocked was in 1979 with approximately 35,000 which appeared to be in very poor condition. Survival of this plant was probably very poor.

In 1975 the test net frequency for suckers in Tolsona Lake was 11.1 fish per net hour. This was a tremendous increase from the 17-year average of 1.88 fish per net hour. It is interesting to note that the 17-year average test net frequency for grayling is 1.89 fish per net hour.

Following the population boom of suckers, a sucker removal program was started in 1976, which consisted of trapping adults as they entered Bessie Creek. By 1980 the net frequency for suckers was down to 1.16 fish per net hour. However, in 1980 the net frequency for grayling was also down to 0.52 per net hour.

There are no apparent reasons for the disastrous decline of grayling in 1979. All of the obvious factors appear to be normal and similar to past data.

Table 3. Dissolved Oxygen Concentrations and Grayling Population Data for Tolsona Lake, 1963-1980.

Year	Lowest* D.O.'s PPM	Grayling Stocked	Grayling Trapped** At Bessie Cr.	Net Freq.*** for Grayling
1963	6.5			0.56
1964	3.5			
1965	4.0		2000+	2.3
1966	3.5		925	4.27
1967	4.0		671	0.14
1968	1.5	100,000	204	0.50
1969	1.0	175,000	Creek dry	1.05
1970	2.5	100,000	480	2.18
1971	0.5		Didn't trap	1.66
1972	3.0	180,000	416	2.10
1973	1.5	75,000	700	2.74
1974	1.0		500	2.25
1975	7.0	80,000	1000+	2.25
1976	1.0	280,000	750	2.48
1977	1.0	80,000	774	4.0
1978	2.0	80,000	636	2.47
1979	5.0	35,000	220	0.74
1980	5.0		26	0.52

* Dissolved oxygen determinations were taken at a depth of 5 feet during the month of March.

** The number of fish trapped does not necessarily mean that is the total run, since in some years only enough fish for egg requirements were trapped.

*** Net frequency is the number of grayling taken per net hour. Test netting is usually done in June and July.

Swanson River Rainbow Population Estimates

Two area lakes with similar limnological characteristics were chosen for survival population estimates of planted Swanson River rainbow trout. Both lakes were planted in October of 1979 with rainbow trout at 671/lb. Tex Smith Lake with 17 surface acres received 4,697 rainbow trout for a total of 293 fish per surface acre. Crater Lake with 16 surface acres received 4,026 for a total of 252 fish per surface acre. Both lakes originally had outlets; however, an outlet control structure was erected in Tex Smith in 1975 (Williams 1976) and the Crater Lake outlet was modified with a French drain in 1979.

Prior to stocking Swanson River rainbow trout, Tex Smith and Crater Lakes were test netted. In Tex Smith Lake, 134 test net hours caught only 10 coho salmon for a frequency of .07 fish per net hour. These coho salmon were the result of a 1975 stocking. In addition, two fyke nets were fished for 96 hours and failed to catch any fish. Crater Lake was test netted a total of 133 hours and 91 coho salmon were caught for a frequency of .68 fish per net hour. One rainbow trout was also captured.

Baited double entrance minnow traps were used for 522 hours and 384 hours for capture and recapture in Crater and Tex Smith Lakes, respectively. Captured fish were marked by an adipose fin clip, then released. The Schnabel method of estimating populations was used and population estimations are shown in Table 4. Although Crater Lake had a much higher population of coho salmon than Tex Smith Lake, the percent survival of the rainbow trout was almost the same at 41% and 40%, respectively.

Growth rates differed in the two lakes. In Tex Smith Lake, which had a slightly lower survival of rainbow trout and a smaller population of residual coho salmon, the fingerling rainbow trout ranged from 80 to 155 mm fork length and averaged 114 mm. Crater Lake had a slightly higher survival competing with a much higher remanent population of coho salmon. Fingerling rainbow trout trapped during this study ranged from 60 to 115 mm fork length and averaged 95 mm.

Gulkana River Creel Census

Table 5 shows the results of the 1980 creel census on the Gulkana River compared to 1978 and 1979 data. There was no significant increase overall in angler-days of effort from 1979 to 1980, however, there was a 38% decrease in the middle section, a 17% increase in the lower section and a 38% increase in the upper section (Figure 2).

Although the effort was higher in 1980 in the lower river section, the hours fished per angler decreased to 1.35 hours from 5.02 hours in 1979 and the catch per angler dropped from 0.276 to 0.049. These decreases were a result of high and muddy water which made fishing extremely difficult in the fly-fishing-only section.

Table 4. Swanson Rainbow Trout Population Estimates in Selected Study Lakes in the Copper River Basin, 1980.

	Date Stocked	# Stocked	Population Estimate	Survival	95% Confidence Level	
					Estimate	Survival
Tex Smith	10/10/79	4,697	1,881	40%	1,395-2,528	30% - 54%
Crater	10/10/79	4,026	1,651	41%	1,324-2,058	30% - 51%

Table 5. Gulkana River Sport Harvest and Effort Estimates, 1978-1980.

	Lower Section			Middle Section			Upper Section			All Sections		
	1978	1979	1980	1978	1979	1980	1978	1979	1980	1978	1979	1980
No. of anglers	942	1,182	1,384	1,613	4,232	2,625	2,510	2,364	3,784	5,065	7,778	7,797
No. of hours	5,326	5,937	1,864	5,362	17,920	1,949	16,718			27,406		
Hours per angler	5.65	5.02	1.35	3.32	4.23	4.55	6.66			5.41		
Catch												
Chinook	112	256	60	64	1,292	490	253	412	770	429	1,960	1,320
Sockeye	132	70	8	26	36	20	243	32	648	401	138	676
Rainbow trout	15	0	0	38	40	27	228	100	728	281	140	753
Grayling	57	52	0	101	204	9	2,058	1,888	5,710	2,216	2,074	5,719
Catch per angler												
Chinook	0.119	0.217	0.043	0.040	0.305	0.187	0.101	0.174	0.203	0.085	0.252	0.169
Sockeye	0.140	0.059	0.006	0.016	0.009	0.008	0.097	0.014	0.171	0.079	0.018	0.087
Total salmon	0.259	0.276	0.049	0.056	0.314	0.195	0.198	0.188	0.374	0.164	0.270	0.256
Catch per angler hour												
Chinook	0.021	0.043	0.032	0.012	0.072	0.041	0.015			0.016		
Sockeye	0.025	0.012	0.004	0.005	0.002	0.002	0.015			0.015		
Total salmon	0.046	0.055	0.036	0.017	0.074	0.043	0.030			0.031		

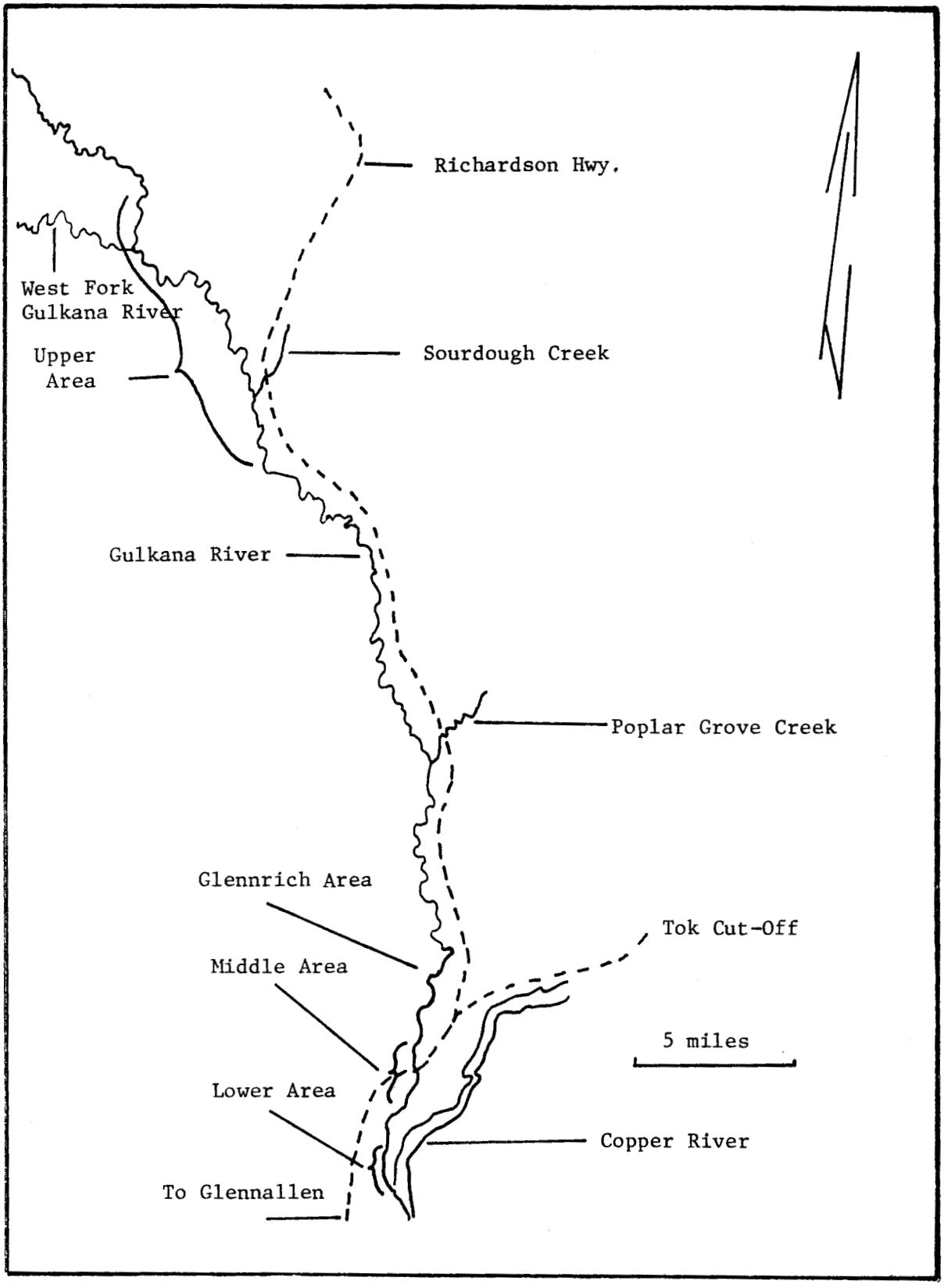

Figure 2. Gulkana River Creel Census Areas.

The large decrease in anglers, effort and harvest in the middle section was also due to poor fishing conditions even though conventional fishing methods (not limited to flies) are allowed there.

In the upper section there was an 87% increase in the catch of chinook salmon and a 19.25% increase in the catch of sockeye salmon over 1979. This was because of more angler effort and a much better run of salmon.

In the upper area the power boat anglers took the majority of salmon (Table 6). These anglers put their boats in the water at Sourdough and travel upstream to the confluence of the West Fork and the main stem of the Gulkana River. During rainy weather almost all of the muddy water comes from the West Fork and fishing is generally good in the main Gulkana River above the confluence because it is clear.

There was an 82% increase in floater days and a 198% increase in their catch of grayling. Floaters generally keep relatively few of the grayling caught. This was true again this year when they kept only 922 (19%) of an estimated 4,828 caught. Float fishermen traditionally are more interested in grayling but in 1980 they took a record 200 chinook salmon.

The residency of anglers who fished the Gulkana River from 1976 through 1980 is shown in Table 7. The only major change was the higher percent of anglers who were from the Fairbanks area. Anchorage anglers more often fish the lower and middle sections, while the Fairbanks fishermen favor the upper section. The lower and middle sections are at least 30 miles closer to Anchorage than the upper section.

Table 8 shows lengths of sport-caught chinook salmon from the Gulkana River 1972-1980. There appears to be a slight decrease in the average fish size since 1977; however, this is not considered to be significant.

Angling effort in the Gulkana River has increased annually since the creel census was started in 1975 (Table 9). The catch of chinook and sockeye salmon has fluctuated considerably during the same period. This is due to (1) water conditions; (2) subsistence and commercial catch; and (3) changes in commercial fish regulations from time to time.

Chinook Salmon Escapement

Escapement data from chinook salmon from index streams in the upper Copper River drainage is presented in Table 10. These aerial counts were made by personnel of the Commercial Fish and Sport Fish Divisions.

These are actual counts and not estimates. Counting conditions in 1980 were fair to poor because of rain, overcast and muddy water.

The Gulkana River is the most important chinook salmon stream in the Copper River drainage. In 1980 only that portion of the system above the confluence of the West Fork was countable. Based on the limited count, it is

Table 6. 1979 and 1980 Gulkana River Harvest and Effort Estimates for the Upper River Section by Shore, Float, and Power Boat Anglers.

	1979	1980
Float Anglers		
Angler Days	768	1,396
Chinook salmon	8	200
Sockeye salmon	0	70
Grayling	1,618 caught, 340 kept	4,828 caught, 922 kept
Rainbow trout	70 caught, 12 kept	628 caught, 356 kept
Power Boat Anglers		
Angler Days	1,184	2,222
Chinook salmon	382	568
Sockeye salmon	32	578
Grayling	200	862 caught, 328 kept
Rainbow trout	30	98 caught, 60 kept
Bank Anglers		
Angler Days	412	166
Chinook salmon	12	2
Sockeye salmon	0	0
Grayling	70	20
Rainbow trout	2	0

Table 7. Residency of Anglers Fishing the Gulkana River in 1976-1980.

	1976	1977	1978	1979	1980
No. of Alaska Communities Represented	15	17	24	21	16
No. of Other States Represented	20	28	27	29	25
No. of Other Countries Represented	2	5	3	6	3
Percent of Anglers from Alaska	91	87	89	88	90
Percent of Anglers from Anchorage	37	33	24	24	24
Percent of Anglers from Fairbanks	32	20	30	36	54

Table 8. Lengths of Gulkana River Chinook Salmon, 1972-1980.

Year	Number of Fish	Length Range (mm)	Average Length (mm)
1972	33	770-1,160	1,026
1973	38	665-1,210	1,025
1974	37	650-1,222	1,089
1975	93	724-1,219	1,001
1976	50	673-1,240	1,027
1977	40	667-1,200	988
1978	54	610-1,255	1,006
1979	154	673-1,275	988
1980	92	670-1,195	997

Table 9. Gulkana River Estimated Sport Harvest and Effort, 1975-1980.

	1975	1976	1977	1978	1979	1980
Angler days	2,734	2,721	3,906	5,065	7,778	7,797
Hours	13,171	12,344	17,735	27,406		
Angler Catch						
Chinook salmon	697	296	332	429	1,960	1,320
Sockeye salmon	47	707	998	401	138	676
Total salmon	744	1,003	1,330	830	2,098	1,996
Grayling			2,970	2,216	2,074	5,719
Rainbow trout		70	104	281	140	443
Catch Per Angler						
Chinook salmon	0.255	0.109	0.085	0.085	0.252	0.170
Sockeye salmon	0.017	0.260	0.256	0.079	0.018	0.087
Total salmon	0.272	0.369	0.341	0.164	0.270	0.260

Table 10. Chinook Salmon Aerial Surveys, Upper Copper River Tributaries, 1975-1980.*

Stream	1975**	1976	1977	1978	1979	1980**
Gulkana River	740	994	924	1,136	1,052	696
East Fork Chistochina River	71	289	132	137	765	575
Mendeltna Creek	NC	35	73	52	5	3
Kaina Creek	NC	37	91	125	279	247
Grayling Creek	NC	17	NC	92	153	66
Little Tonsina	161	98	35	285	285	70

* The figures are actual counts and not estimates. These data are considered as minimum escapement figures.

** Counting conditions in 1975 and 1980 were generally poor due to high, muddy water during most of the season. Only approximately one half of the Gulkana River was counted in 1980.

NC No counts made.

estimated that there were over 1,000 spawning chinook salmon in the Gulkana River after the sport fish harvest.

Gulkana River Grayling

A comparison of length of sport-caught grayling taken from the Gulkana River in 1968, 1978 and 1980 is shown in Table 11. The average size is 22 mm less than in 1968 and only slightly less than in 1979. These fish were caught by ADF&G personnel and all fish were measured regardless of size. These fish were taken during a float trip between Paxson Lake and Sourdough. This portion of the river is the most heavily used by grayling anglers. Although there was a slight decrease in the size of grayling in 1980 over previous years, it is not considered significant.

Figure 3 shows the percentage of fish caught in the various age/size groups for 1978, 1979 and 1980. As can be seen, Age III and IV grayling make up the majority of the catch with Age III dominating.

Slana River Whitefish Fishery

The Slana River sport fishery on round whitefish, in Table 12, and broad whitefish occurs in October after the glacial-fed stream clears up. The fishery takes place at night with lanterns used for illumination and the fish are harvested by the use of spears.

This fishery has been lightly monitored since 1964. There have been recent public concerns that the fishery was being depleted because of excessive effort and harvest.

In October 1980, measurements were taken of sport-caught whitefish and compared to past data (Table 12). While some of the past sample sizes are too small to be significant, it is apparent that there has been little change in the length range and average size of fish harvested. There has been little change in the composition and population of this whitefish fishery.

Recently, the only access to that portion of the Slana River where the fishing occurs passed into private ownership. In 1980 the number of participants was notably less than in past years because of the change from public to private ownership.

Robe Lake Investigations

Investigations of the limiting factors of salmon production and the feasibility of an enhancement program in the Robe Lake system were initiated in 1972. During 1980, through a grant funded by the Coastal Energy Impact Program, the Valdez Fishery Development Association assisted in this study. Data collected in this joint effort added to, and supported the considerable physical and biological information previously collected and reported. Dissolved oxygen concentrations taken at previously selected sites (Figure 4) concur with findings reported by Williams (1980).

Table 11. Length Data from Gulkana River Arctic Grayling, 1968, 1978, 1979 and 1980.

Year	Number of Fish	Length Range (mm)	Average Length (mm)
1968	100	177-425	290
1978	190	177-425	294
1979	146	86-420	273
1980	137	95-400	268

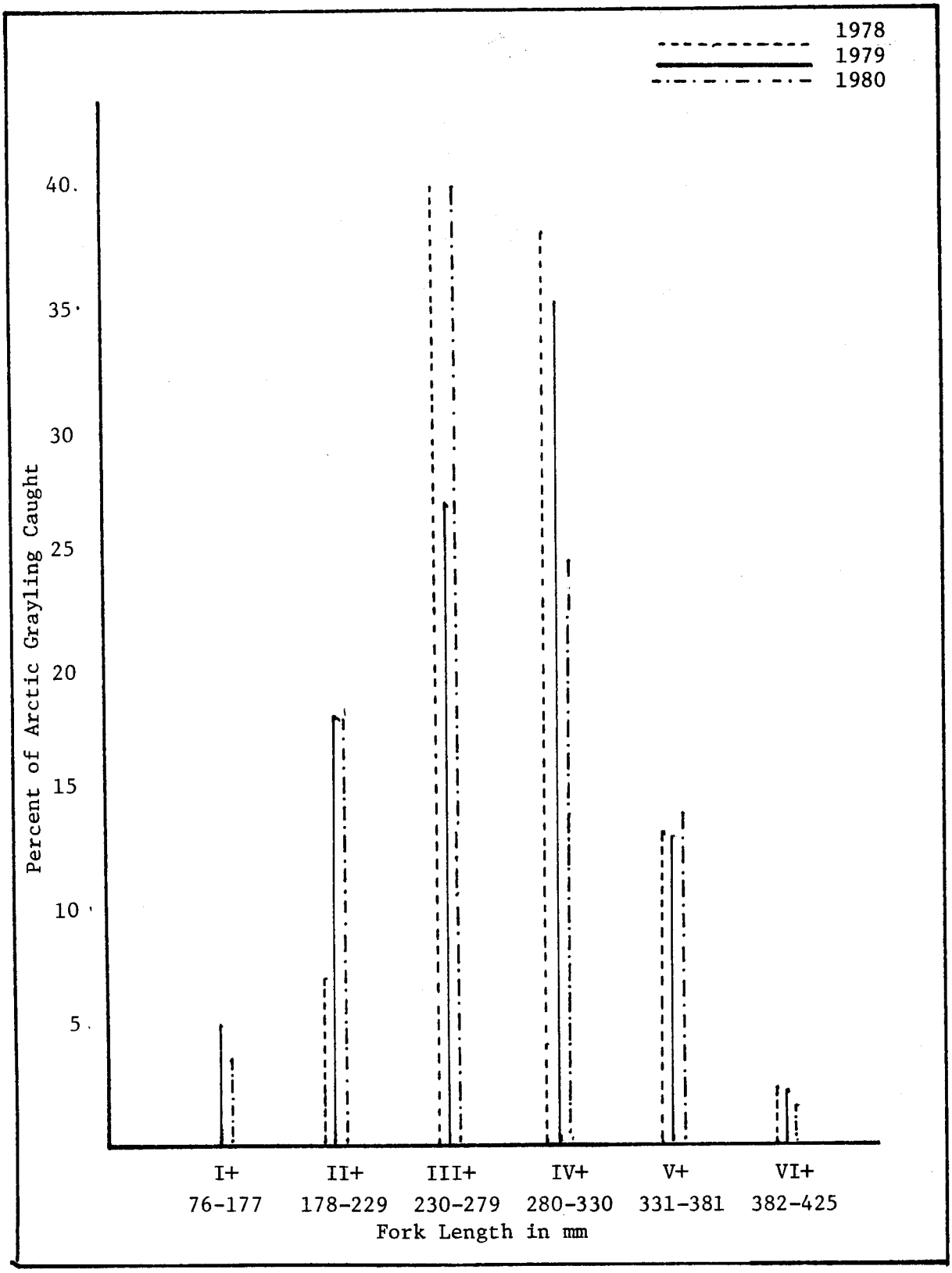

Figure 3. Age and Length Frequency of Gulkana River Grayling, 1978, 1979, 1980.

Table 12. Length Data of Slana River Whitefish.*

Data	No.	Fork Length Length Range	Average
10/22/64	28	292 - 348 mm 11.5" - 13.7"	320 mm 12.6"
10/19/69	55	235 - 446 mm 9.25" - 17.5"	353 mm 14"
10/17/72	50	320 - 430 mm 12.5" - 17"	368 mm 14.5"
10/16/74	16	242 - 413 mm 9.5" - 16.3"	349 mm 13.5"
10/21/75	101	283 - 423 mm 11" - 16.5"	346 mm 13.5"
10/13/76	102	250 - 430 mm 10" - 17"	347 mm 13.5"
10/14/77	25	330 - 470 mm 13" - 18.5"	370 mm 14.5"
10/10/78	13	311 - 381 mm 12" - 15"	359 mm 14"
10/19/79	41	270 - 395 mm 10.5" - 15.5"	349 mm 13.8"
10/13/80 - 10/25/80	144	280 - 490 mm 11" - 19"	368 mm 14.5"

* These measurements were taken from fish harvested by sport fishermen using spears. The dates listed are not necessarily those when the fish were most abundant.

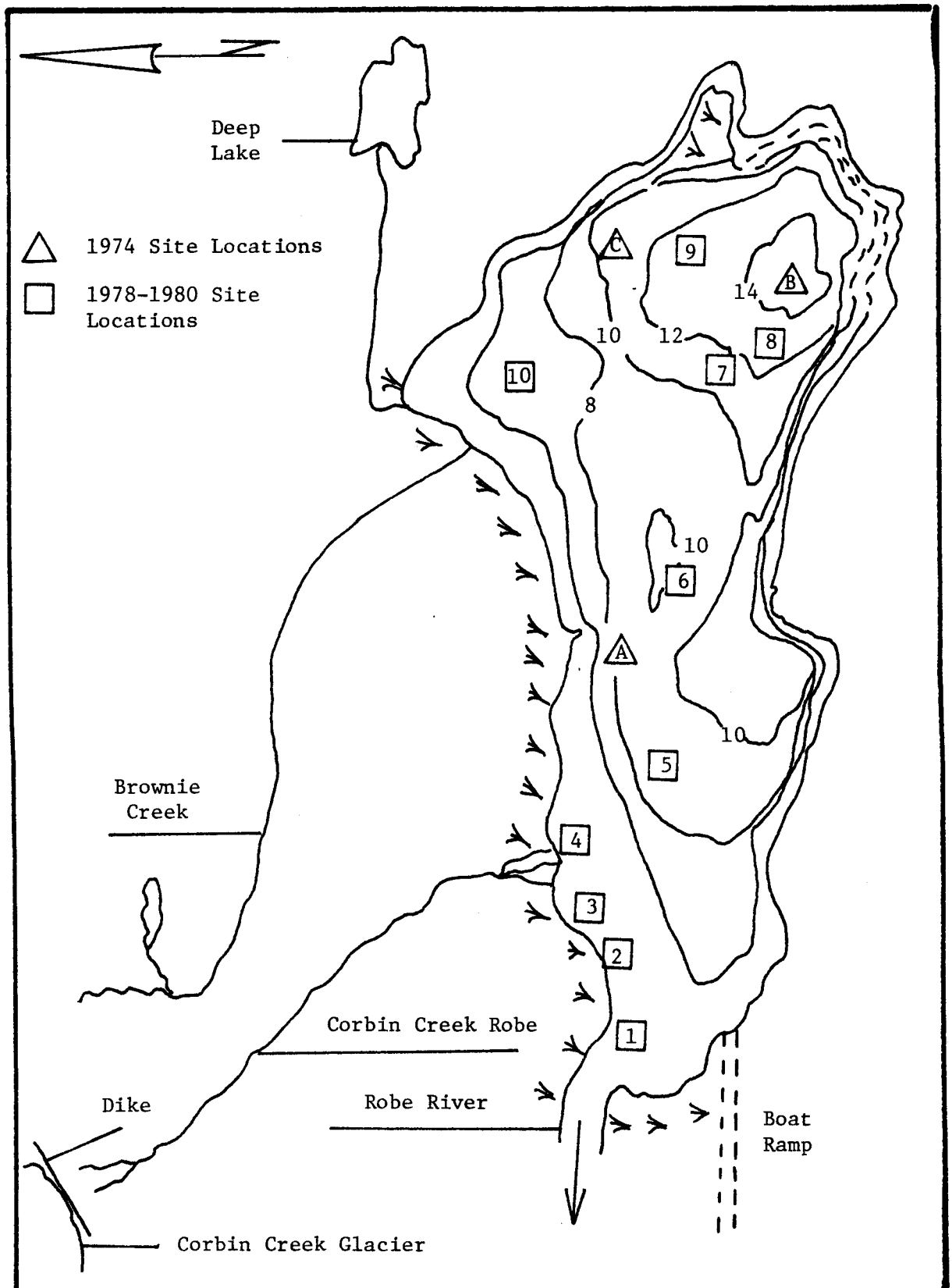

Figure 4. Locations of Study Sites, Robe Lake System.

In 1980 a beach seine and baited minnow traps with double entrances were used to capture young-of-the-year and Age I+ coho salmon. The results of this trapping provided length and growth data which was essentially the same as previously reported. During the trapping program it was found that when the traps were fished for 20 or more hours at depths having D.O. concentrations of 2 ppm or less, all of the coho salmon were dead. It is surmised that the salmon descend from areas of the lake having acceptable D.O. levels to these lower levels for feeding purposes. The length of time these fish can survive in these oxygen depleted zones is not known but presumably it is rather short.

In 1980 Corbin Creek was again sampled for juvenile coho salmon. Valdez Fisheries Development Association received approval from Alaska Department of Fish and Game, F.R.E.D. Division, for a left ventral fin clip of Corbin Creek coho juveniles. In May and July 3,600 Age 0+ coho were clipped for a migration study. Recapture of these coho showed minimal lineal movement in Corbin Creek. Gill-netting, beach-seining and fish-trapping of Robe Lake, Robe River, Brownie and Deep Creeks from June through October did not recover any clipped Age 0+ salmon. The number of unmarked juvenile coho salmon taken in December indicate that these young fish drop out of Corbin Creek in November and December.

The first marked coho salmon were trapped from Robe Lake in December 1980 when three were taken. Three more were trapped in January 1981.

Port Valdez Stream Surveys

Foot surveys were again conducted on salmon spawning streams in Port Valdez. Table 13 is a list of the enumeration areas and Figure 5 shows their locations. Results of these surveys are shown in Table 14. Normally odd numbered years have poor returns of pink salmon. This was true again in 1980 but the number of adult salmon counts was 288% higher than in any even year since 1974.

The count of coho salmon, 6,801, was the highest on record. The largest number were counted in the Robe Lake system which includes the Robe River, Robe Lake, Brownie and Corbin Creeks. The numbers presented in Table 14 are actual counts and not estimates and are considered minimum figures.

Habitat Protection Investigations

In 1980 over 20 construction oriented projects were reviewed and monitored to ensure adequate protection for the environment and fishery resources. In addition, many placer mining applications and water rights requests were reviewed.

The extension of the airport at Valdez presented considerable siltation problems to anadromous streams No. 141 and 142 which are important pink salmon streams. Construction of settling basins and filter plugs finally eliminated the problem.

Table 13. Valdez Area Salmon Enumeration Areas.

Anadromous Stream Number	Name	Count Areas
221-60-137	Robe Lake/River System	Robe River Robe Lake Corbin Creek Brownie Creek Deep Creek
221-60-137	Lowe River System	4.5 Mile Pit 6.5 Mile Seep 8.5 Mile 12 Mile 17 Mile
221-60-139	Sewage Lagoon	Entire drainage
221-60-141	Loop Road 1	Entire drainage
221-60-142	Loop Road 2	Entire drainage
221-60-143	Siwash Creek	Entire drainage
221-60-144	Ess Creek	Lower 1/2 of drainage
221-60-145	City Limits (Crooked Creek)	Waterfalls downstream through Slough area
221-60-147	Mineral Creek	Brush (Horsetail) Creek

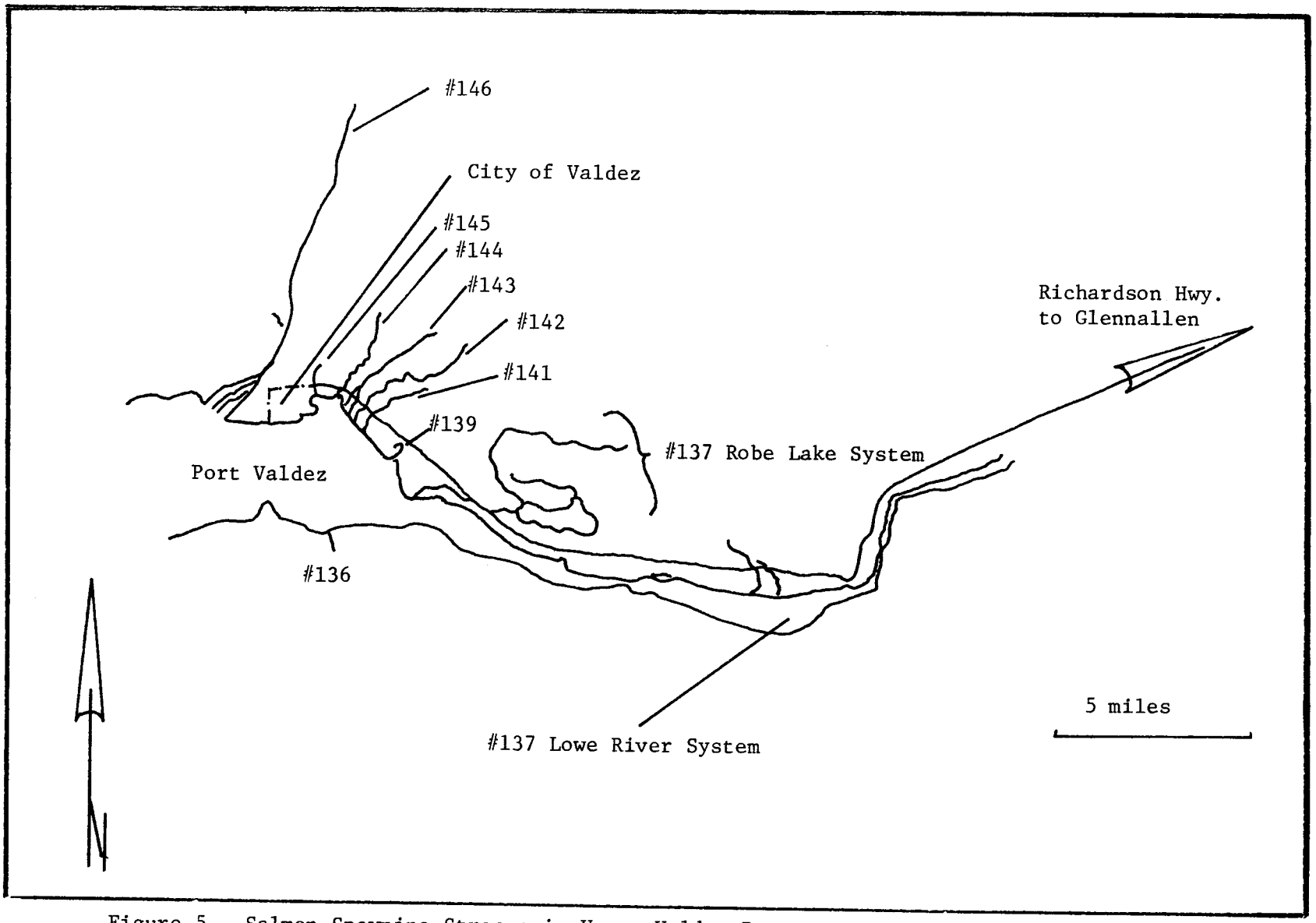

Figure 5. Salmon Spawning Streams in Upper Valdez Bay.

Table 14. Port of Valdez Salmon Counts, 1973-1980.

	#139 Sewage Lagoon	#137 Lowe River System	#137 Robe Lake System	#141 Loop Road I	#142 Loop Road II	#143 Siwash	#145 City Limits	#147 Mineral Creek System
Pink Salmon								
1973		6,549	15,000	7,000		26,770	1,700	2,235
1974		N/C	N/C	262		8	98	217
1975		15,387	2,461	5,537		33,113	1,262	947
1976		1	0	18		5	5	8
1977	1,418	1,441	330	18,718	4,101	22,120	2,714	179
1978	0	0	2	66	0	0	10	0
1979	1,657	1,770	1,546	16,246	6,012	29,232	5,512	53
1980	43	4	454	790	3	214	178	0
Chum Salmon								
1973		1,063	125	N/C		232	1,812	7,111
1974		N/C	N/C	0		16	483	1,454
1975		N/C	N/C	N/C	N/C	N/C	N/C	N/C
1976		270	0	6		2	1,080	564
1977	0	0	0	0	0	0	0	0
1978	0	1	0	0	0	0	111	68
1979	0	1	11	0	0	2	1,277	126
1980	0	190	0	5	0	0	2,186	140

Table 14 (Cont.). Port of Valdez Salmon Counts, 1973-1980.

	#139 Sewage Lagoon	#137 Lowe River System	#137 Robe Lake System	#141 Loop Road I	#142 Loop Road II	#143 Siwash	#145 City Limits	#147 Mineral Creek System
Coho Salmon								
1973		N/C	4,000	N/R		6	N/R	20
1974		N/C	1,662	N/R		0	N/R	0
1975		1,506	1,533	N/R		0	N/R	16
1976	0	1,310	1,049	0		0	2	66
1977	0	1,363	1,522	N/R	0	N/R	N/R	1
1978	0	1,643	5,091	0	0	0	0	0
1979	0	1,536	3,470	0	0	0	0	31
1980	0	1,329	5,467	1	0	0	2	2
Red Salmon								
1973			1,300					
1974			3,000					
1975		2	10					
1976	0	1					1	2
1977	0		9,188					
1978	0	29	972	0	0	0	0	4
1979	0	16	2,216	0	0	0	0	4
1980	0	0	993	0	0	0	0	7

N/C = No count taken
N/R = No run

Construction of the hydroelectric complex at Solomon Gulch near Valdez was monitored. The plant will not be completed until fall of 1981 and the operation will be monitored to determine the effects of the 9 cfs minimum flow requirement for the lower section of Solomon Gulch Creek.

Very little work was done on the construction of the Alpetco Plant in Valdez in 1980. It is expected that there will be more activity in 1981 and increased surveillance will be required.

A minor oil spill occurred on the Chistochina dike during the winter. The frozen ground prevented the oil from penetrating the soil and the spill was burned off.

Several state land selections, reclassifications and proposed sales were reviewed and appropriate comments to protect fisheries values were presented.

DISCUSSION

Survival studies on Swanson River rainbow trout were conducted in Tex Smith and Crater Lakes. Although Crater Lake had a much higher residual population of coho salmon than Tex Smith Lake, the percent survival was almost the same at 41% and 40%, respectively. The ability of the Swanson River rainbow trout to avoid capture by other fish species is apparently excellent and they appear to be well suited for this area. In the future other suitable lakes will be stocked with these rainbow trout and further survival and growth studies will be conducted.

The Slana River whitefish fishery is unique in this area. The fishery occurs in October when the glacier-fed river clears up. Fish are taken at night with spears using lanterns for illumination. Recently there has been some public concern that this fishery is being overharvested.

Limited length data gathered since 1964 show no significant change in the length, range and average length of fish taken. The access road to the fishing area has recently been transferred to private holdings. This significantly reduced the effort in 1980 and this will probably continue in the future.

Robe Lake studies were continued in 1980 in conjunction with the Valdez Fisheries Development Association. Thirty-six hundred Age 0+ coho salmon were captured in the primary spawning stream, Corbin Creek, and finclipped. In later trapping operations in Robe Lake and Robe River, none of the marked fish were recovered until December, giving evidence that the majority of the coho salmon hatched in Corbin Creek also rear there in their first year. During winter coho salmon trapping operations at Robe Lake, fish caught at depths having dissolved oxygen concentrations of 2 ppm or less were all dead after 20 hours. Apparently the coho fry and fingerlings descend periodically to these areas for feeding purposes and then return to levels of the lake having more hospitable D.O. concentrations.

The length of time the fish can remain in areas of low D.O.'s is not known but presumably it is short.

Tolsona Lake has been used as a grayling egg-take site since 1965. The average number of eggs taken annually was approximately 900,000 to 1,000,000. Prior to 1979 it had not been necessary to utilize the entire spawning run into Bessie Creek in order to satisfy egg requirements. However, in 1979 only 220 grayling entered the creek to spawn. After the egg-take, 206 of these grayling were fin-clipped. Two months later the lake was test-netted. During trapping operations at Bessie Creek in 1980 only 26 adult fish entered the stream. Seventeen of these had been marked in 1979. During test-netting later, four of the 23 grayling caught were marked.

All of this data points to a rapid declining grayling population. The reasons for this are not readily apparent. While Tolsona Lake is well known for low winter dissolved oxygen concentrations, the levels during the winters of 1978, 1979 and 1980 were well within the non-lethal range for grayling. In 1975 there was a dramatic increase in the sucker population. The test net frequency for suckers was 11.1 fish per net hour as related to a 17-year average of 1.88.

As a matter of interest, the 17-year average test net frequency for grayling is 1.89 fish per net hour. It was felt the large biomass of suckers could have some effect on the grayling population. In 1976 a program of sucker control was started. This was carried out by trapping and seining in Bessie Creek where they spawn. By 1980 the test net frequency was down to 1.16 fish per hour. However, the net frequency for grayling in 1980 was 0.52 fish per hour which was the third lowest in 17 years of records.

The lake has been stocked with at least 75,000 grayling fry annually since 1968 and this appeared to be adequate until the unexplained decline in 1979. The last time it was stocked was in 1979 when approximately 35,000 fry in very poor condition were planted. A very low survival was expected. There is no obvious reason(s) for the rapid decline of grayling in Tolsona Lake. This same thing occurred with grayling in a lake in Arizona which was used as an egg-take site (William Gaylor, personal communication). The reason(s) for the decline in the Arizona lake was not determined.

It is tentatively planned to secure grayling from another approved site and introduce them into Tolsona Lake in an effort to reestablish the population.

A creel census of sport fishermen has been conducted on the Gulkana River since 1975. During that time there has been an annual increase in angler days of use except in 1980 when the effort was almost identical to 1979. The harvest of chinook salmon has fluctuated somewhat and hit a high of 1,960 fish in 1979. This was because the commercial fishery on chinook and sockeye salmon on the Copper River run was closed that year. In 1980 a commercial quota of 15,000 chinook salmon was established. As a result the 1980 Gulkana River sport fish catch was the second highest recorded. In

the upper section of the Gulkana River there are three distinct types of anglers: float fishermen, power boat fishermen, and bank fishermen. The float fishermen traditionally catch the majority of the grayling. In 1980 they reported catching 4,828 grayling and releasing all but 922. On an average 3-4 day float trip it is not practical to try and preserve grayling for future consumption.

The lower section always receives the lightest fishing effort since it is a fly-fishing-only area. Success in this area is therefore dependent on water conditions. In 1980 the river was high and muddy during most of the season and the catch rate in the lower section dropped from 0.217 chinook salmon per angler in 1979 to 0.040 per angler in 1980. The poor fishing conditions also caused a decrease in effort, harvest and catch rate in the middle section.

The Gulkana River chinook salmon fishery is basically managed on escapement rather than on the sport fish catch. The sport fish catch since 1975 has varied from 296 to 1,960 annually. Also the commercial and subsistence catch varies from year to year. As a rule of thumb, the fishing is usually poor in the middle and lower section when the river is high and muddy. It is also impossible to make aerial salmon surveys under those conditions. When survey conditions are good, several flights are made throughout the summer. The desired minimum escapement is 1,000 actual counted chinook salmon, and if surveys indicate an escapement below this figure the fishery can be closed.

The catch of grayling increased to 5,719 in 1980 which is an increase of 93% over the highest previous year of record (1977). This is probably the result of an 82% increase in floater angler days. In 1980 almost 100% of the grayling caught came from that section of the river from Paxson Lake downstream to Sourdough.

The Gulkana River from Paxson Lake to Sourdough has been created a Wild and Scenic River by Congress. This action will not doubt result in Federal regulations which will have impact on the use of the river and this will affect the harvest.

Lengths of grayling from this section of the river have been collected 4 different years from 1968 to 1980. The data show only a slight decrease (22 mm) in the average size of grayling caught. The fish were sport-caught by Fish and Game personnel and all fish regardless of size were measured.

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